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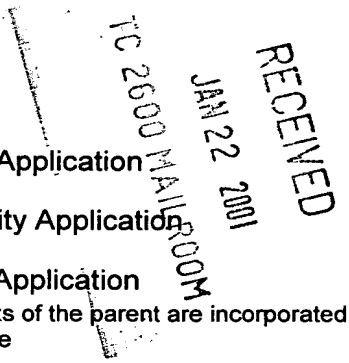
Invention: ARRANGEMENT FOR WIRELESS COMMUNICATIONS

Inventor (s): LAUKKANEN, Risto

Pillsbury Winthrop LLP
Intellectual Property Group
1100 New York Avenue, NW
Ninth Floor
Washington, DC 20005-3918
Attorneys
Telephone: (202) 861-3000



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- ☒ Marked up Specification re
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SPECIFICATION

ARRANGEMENT FOR WIRELESS COMMUNICATIONS

FIELD OF INVENTION

The present invention relates to a wireless communications ~~{arrangement or system with inbuilt integrated electronics, said arrangement being connected to a host unit via connection means}~~ **[system and apparatus]**. More specifically, the invention relates to ~~{an arrangement or}~~ **[wireless communication]** system **[and apparatus]** which relieves a connected host unit from context switching procedures, unnecessary processing of disturbance and interference signals**[,]** and work-demanding interruption routines in the direct wireless exchange of information ~~{at relatively short distances}~~ between host units via arrangements in accordance with the invention.

DESCRIPTION OF THE BACKGROUND ART

Known arrangements for wireless communications with direct signal transmission between communications units ~~{ i.e. in the absence of intermediate active transmission systems such as mobile telephone systems for processing or forwarding signals,}~~ such as PCs or other host computers, printers, facsimile equipment or other communications units~~{ }~~**[,]** include equipment for the **[direct]** wireless transmission of data, far instance IR equipment, radio equipment or ultrasonic equipment. ~~{This equipment }~~**[The direct signal transmission between communication units is achieved without the use of intermediate active transmission systems, such as, for example, mobile telephone systems, which receive and process the signals from one unit and relays the signals to another unit. The equipment for the direct transmission of data]** is, in turn, controlled and operated by communications protocol, error correcting routines arid possibly routines for signal disturbance filtration of

wireless transmitted signals~~{, these}~~**[. These]** routines and protocols ~~{being}~~ present ~~{in said}~~ **[within the]** communications units.

It will be understood that, ~~{for instance,}~~ a mobile telephone system is not accessible for the transmission of information between, ~~{e.g.,}~~ **[for example,]** arrangements where ~~{communication shall}~~ **[communications are]** often ~~{be}~~ instantaneous with large quantities of data ~~{and at}~~**[, requiring]** high speeds. ~~{It}~~ **[In such cases, it]** would untenable to expect access to a mobile telephone system for transmission purposes. Often no unoccupied channels are available and the mobile telephone traffic varies throughout a calendar day.

Protocol, routines**[,]** and hardware integrated in communications units for wireless transmission require a high degree of computer power, which steals memory space and time for other processing in communications units~~{; received}~~**[. Received]** signals ~~{shall}~~ **[may]** often ~~{be converted to as}~~ **[require conversions to an]** ASCII code or other standard alphanumerical character codes with control characters.

Furthermore, ~~{in}~~ **[the receiver portion of]** communications units with integrated wireless communication ~~{the receiver of wireless transmitted signals operates continuously with the interpretation of outer disturbance, interferences, and noise, wherewith}~~ **[capabilities operates continuously in the presence of external disturbances, interference signals, and noise. As such,]** the communications unit or host unit operates continuously and unnecessarily ~~{with interpretation, even though the signals are shown to be noise. Such disturbances sources and noise sources}~~ **[in the presence of such noise, even though such signals may be detected as noise. Sources of such disturbances and noise]** may, for instance, consist of the remote controls of other apparatus, such as TV apparatus, lighting controls, cordless telephones, etc.

The aforesaid circumstances, constitute a problem is existing known wireless communication ~~{arrangements}~~ **[apparatus]** or systems with respect to rapid and effective transmission of information.

SUMMARY OF THE INVENTION

It is an object of the present iuvent3on to provide au effective solution to the aforesaid problem with regard to the rapidness and effectiveness of direct communication between communication units in the absence of processing via intermediate, active link systems which forward signals in the digital transmission of data between communications traits.

A first alternative embodiment of the invention involves using means fur signal conversion in the arrangement solely for filtering disturbances in received wireless-transmitted signals (pulses), wherein communications protocol is included in the host unit to which the arrangement is connected.

In a second alternative embodiment of the invention, there is provided a separate external arrangement which in wireless transmission perform all signal processing externally of a heat unit, wherein only signals between the host unit and the inventive arrangement are transmitted in the form of alphanumerical codes with control characters, preferably binary characters.

An object of the invention is also to connect an inventive arrangement to a host unit via standard host unit input and output ports.

Yet another object of the Invention is to enable a host unit connected to an inventive arrangement to maintain communication between other external units in a conventional manner, for instance via local network connections through the medium of connection means, therewith enabling the wirelass transmission to be applied without disturbing ox delaying other communication, when applicable.

The objects of the invention ace achieved with an arrangement for wireless communication having inbuilt integrated electronics and being connected to a host unit via connection means.

The arrangement includes process-controlled integrated electronics with transmitter means and receiver means, said means functioning to establish a direct transmission link with other means for wireless pulse transmission and wireless pulse reception respectively, means for filtering out disturbance data and noise, signal conversion means, and input and output ports for connection to the host unit through the medium of connection mean. The arrangement including said filter means operates as a buffer to the host unit, insomuch that, the host unit receives and processes via said connect-ion means solely data intended for the host unit.

In one embodiment of the invention, the arrangement may include protocol control means for transmitting and receiving data between integrating devices anti. between the host unit, wherein the arrangement converts received wireless-transmitted data to an alphanumeric character code optionally with control characters for transmission to tie host 'twit, or converts alphanumeric character codes received from the host unit and poss3-bly including control characters to pulses for wireless transmission. The arrangement thus operates autonomously from the host-unit concerned with regard to wireless transmission and its signal conversion.

When a host unit has an inventive arrangement connected thereto, the unit will use the arrangement on an intermittent basis and other existing network connections continuously, or, alternatively, the unit will determine when and to which extent the arrangement is used in relation to other existing network connections.

Alternatively, the arrangement may constitute the sole communication path of a host unit for external communication.

It is preferred that the arrangement is portable when not integrated in a host unit, and that the arrangement Can be connected to a host unit via standard I/O ports of said unit and said arrangement without needing to supplement the host unit with wireless communication software.

BRIEF DESCRIPTION OF THE DRAWING

The present invention will now he described in more detail with reference to the accompanying drawing, in which Fig. 1 illustrates schematically a communications link for the wireless transmission of digital data with an inventive arrangement in the form of a black box; and

Fig. 2 is a block schematic illustrating a communications link for the wireless transmission of digital data in accordance with the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

With the intention of solving the aforesaid problems and achieving the aforesaid objects by means of the present invention, ~~{there is used an arrangement which operates}~~ **[and apparatus and system are presented, which operate]** completely or partially ~~{externally of}~~ **[external to]** host communications units, as described below.

In this regard, Fig. 1 illustrates schematically a communication link 9 for the direct wireless transmission of digital data, having two inventive ~~{arrangements}~~ **[apparatuses]** 12 in the form of black boxes connected to a ~~{communications}~~ **[host]** unit 10 through ~~{the medium of}~~ **[a]** connection ~~{means, in}~~ **[mechanism. In]** the illustrated case ~~{a data cable 14.}~~**[, the connection mechanism comprises a data cable 14.]**

~~{By direct transmission is meant here that }~~

[It is to be noted that, direct transmission as used herein, indicates that there are] no intermediate active systems **[that]** receive transmitted signals and forward ~~{said}~~ **[the]** signals to **[the]** intended receivers. ~~{Active systems }~~**[In other words, the communication apparatuses directly communicate with each other across a direct communications channel established therebetween. Active systems,]** such as mobile telephone systems**[,]** involve the transmission of data via intermediate systems, such as base stations and switching centres for forwarding signals to the receiver, which also involves **[incurring]** extra costs for using the ~~{mobiles}~~ **[mobile]** telephone system. The present invention relates, ~~{e.g.}~~ **[for example]** , to two computers which are often located at a relatively short. distance apart and which **[directly]** communicate with each other, often in the same room~~{, and consequently direct}~~**[. As a result,]** communication between the computers via an active intermediate system or an active intermediate link would only incur unnecessary costs in respect of equipment, subscription fees, etc., and considerably higher loading of the active system, which often has a limited number of channels. Thus, **[the]** transmitter and receiver ~~{in communicating arrangements according to the }~~**[mechanisms in the communication apparatuses of the present]** invention establish an individual direct communications link which can use passive reflectors for transmission, e.g. walls, ceilings, roofs, parabolic reflectors, mirrors, etc. The present invention provides practically immediate access to a data transmission, particularly when the access times are compared with the access times applicable in mobile telephone systems. It will be understood that a mobile telephone system is not accessible for the transmission of information between, e.g., devices where communication ~~{shall}~~ **[may]** often take place instantaneously and with large quantities of data and at high speeds. It would be untenable to expect access to a mobile telephone system for transmission purposes. Often, no unoccupied channels are available and the traffic over mobile telephone systems varies throughout a calendar day.

Furthermore, indoor coverage for mobile telephone ~~{Systems is highly doubtful,}~~ **[systems may be]** particularly in windowless spaces. The present invention also provides an improvement in existing wireless transmission systems that do not utilize ~~{an}~~ active intermediate ~~{system}~~ **[systems]**.

The connection ~~{means}~~ **[mechanism]** may be a data cable with standard electric contacts for mounting base connections, soldered for **[the]** integrated connection of the host unit 10, adapters for direct, integrated, connection to a host unit 10, and so on. ~~{The arrangement}~~ **[Apparatus]** 12 may thus also be integrated in a host unit in a manner known to the skilled person, via connection ~~{means}~~ **[mechanism]** 14. The **[direct communication]** link 9 is intended for the transmission of data between the ~~{arrangements}~~ **[apparatuses]** 12, as indicated by the unidirectional arrows in Fig. 1. The distance between the ~~{arrangements}~~ **[apparatuses]** 12 may vary between about 0.5 m to several 100 meters, indicated by the two-directional arrows in Fig. 1. The ~~{arrangements}~~ **[apparatuses]** 12 need not necessarily be directly visible to one another, and reflectors (not shown), mirrors or other reflective surfaces may be used to reflect light, radio waves, ultrasonic signals, etc.

The wireless transmitter units may be directed more or less divergently adapted or omnidirectional.

Communication between the ~~{arrangements}~~ **[apparatuses]** 12 may be two-directional or unidirectional in both directions, such as duplex, full duplex and simplex communication.

The two ~~{arrangements}~~ **[apparatuses]** 12 both transmit and receive data in pulse form, such as light, radio or ultrasonic pulses, depending on the wireless transmission technique used. Although infrared light (IR light) is the most obvious choice with regard to light pulses, this does not exclude the use of other optical light transmitting techniques.

The ~~{arrangements}~~ **[apparatuses]** 12 are constructed to filter-out transmission disturbances and noise via an internal filtering program or via internal hardware, so that erroneous information will be sorted out or errors corrected**[. Such sorting and error corrections may be achieved]** with the aid of typical codes for the transmission of wireless digital data, for instance ~~{with the aid of}~~**[, employing]** known CRCs (Cyclic Redundancy Codes) for error-free transmission of received data to host units 10.

A host unit 10 may comprise a PC, another. host computer, or communications units that include integrated processor-based electronics for ~~{communication}~~ **[communicating]** with other units. These communication units 10 are herewith able to maintain the transmission of information in a typical manner via cables or other connection means in, e.g., a network of units 10, wherein a connected arrangement 12 ~~{can}~~ **[may]** be used for the intermittent transmission of data when so required. ~~{This last mentioned}~~ **[The]** intermittent use of a connected arrangement may be due to a number of reasons, for instance the transmission of data to another network, the replacement of modem transmission between freestanding PC units, the use of specific peripheral equipment control functions, etc.

The exchange of information between **[the]** external ~~{arrangements}~~ **[apparatuses]** 12 and host unit 10 through data cable 14 may be effected e.g., in a serial RS232 channel or some other suitable standard serial or parallel data channel. The cable 14 is connected between host unit 10 and arrangement 12 via one or more standard serial or parallel input and output ports (I/O ports).

Reference is now made to Fig. 2, which is a block schematic illustrating a communications link 9 having two ~~{arrangements}~~ **[apparatuses]** 12 for the wireless transmission of digital data in accordance with the present invention.

The inventive ~~{arrangement}~~ **[apparatuses]** 12 ~~{is}~~ **[are]** comprised of integrated processor-based ~~{20}~~ electronics and the central processor unit (CPU) **[20]** has integrated

therein**[, a]** filter ~~{means}~~ **[mechanism]** 26, software or hardware for data flow filtration, error correction and protocol handling. ~~{The CPU (central processor unit)}~~ **[CPU 20]** has a transmitter ~~{means}~~ **[mechanism]** 22 connected to a receiver ~~{means}~~ **[mechanism]** 24 via the filter ~~{means}~~ **[mechanism]** 26. Naturally, the filter ~~{means}~~ **[mechanism]** 26 may be a device located externally of the CPU and connected between said unit 20 and the receiver ~~{means}~~ **[mechanism]** 24**[.]** The CPU is also connected to **[a]** signal conversion ~~{means}~~ **[mechanism]** 28**[,]** which converts signals to a form intended for the transmission of data between ~~{arrangements}~~ **[apparatuses]** 12 and host units 10 respectively.

Although not shown, the CPU includes typically I/O ports for communication on a worldwide basis and to which the cable connection 14 is connected via an appropriate standard mounting base (not shown).

Units and means and the communication technology employed therebetween, this technology being included in the ~~{arrangement}~~ **[apparatuses]** 12, are well known in the present technical field and do not therefore need to be described in detail in order for one skilled in this art to practice the invention. On the other hand, the combination of means and units localized in ~~{an arrangement}~~ **[apparatus]** 12 for an external. host unit 10 is unique, wherein the host unit 10 in one embodiment greatly relieves time-consuming transmission and reception tasks that load interruption routines and context switching (data term for switching between working routines) for CPU-based ~~{communications}~~ **[host]** units 10, while these tasks are totally obviates in second embodiment. In a first embodiment of the invention, the ~~{arrangement}~~ **[apparatus]** 12 includes the filter ~~{means}~~ **[mechanism]** 26 having **[a]** filtering protocol but lacks the communications protocols that host units 10 usually communicate with externally~~{, in}~~**[. In]** other words**[,]** host units ~~{must continue to include such protocol}~~ **[10 require such protocols]** in order to satisfy the object of the invention.

~~{The means}~~

[Filtering mechanism] 26 for filtering-out disturbing or interfering data ~~{constitute an essential}~~ **[constitutes an important]** part of the invention. It will be understood that a wireless ~~{communication}~~ **[host]** unit 10 which communicates in accordance, with present techniques is constantly required to interpret interference noise from apparatus in its surroundings, such as noise from TV remote controls, radio transmitting apparatus, e.g., mobile telephones, etc. This requires **[that]** the **[host]** unit 10 ~~{to interpret}~~ continuously **[interpret]** signals arriving at the receiver and ~~{deciding}~~ **[determining]** whether the data is relevant data or interference data. An ~~{arrangement}~~ **[apparatus]** 12**[,]** which includes filter ~~{means}~~ **[mechanism]** 26 for filtering-out disturbance data and interference data ~~{completely}~~ relieves a connected host unit 10~~{, which is then able}~~ **[from such determinations, thereby allowing unit 10]** to rest while awaiting the arrival of relevant, filtered data.

In another embodiment, ~~{the arrangement}~~ **[apparatus]** 12 also includes the aforesaid communications protocols that a host unit **[10,]** connected to ~~{the arrangement 12 }~~**[apparatus 12,]** will normally include and which thus ~~{operate fully}~~ **[operates]** autonomously from concerned host unity 10 with respect to the data processing of transmission and reception signals.

~~{An arrangement}~~

[Apparatus] 12 according to the second embodiment**[,]** includes **[the]** protocol handling of data for known alphanumerical character codes with control characters ~~{in the arrangement 12}~~. Thus, a host unit **[10]** is able to send and receive, via data cable 14, alphanumerical text files with control characters, e.g., ASCII characters, directly to/from the external arrangement without needing to process received data more than is required for internal data processing reasons.

As before described, host units 10 are still able to communicate via conventional network connections, wherein specific applications may enable parts of the network communication to take place via the external wireless communication arrangement 12 between host units 10 when necessary.

When a host unit 10 wishes to communicate with another host unit, information is sent, e.g., to the input port of said other host unit via a serial RS232 channel. The transmitting ~~{arrangement}~~ **[apparatus 12]** converts the information arriving from its host unit **[10]** into a pulse train of electromagnetic signals, or in applicable cases into pulse trains of acoustic signals**[,]** and sends the pulse trains via the wireless link to a similar ~~{arrangement 12 which is the target of said communication}~~ **[apparatus 12, which is intended to receive the transmitted signals]**. The received pulse trains arrive at the filter ~~{means}~~ **[mechanism]** 26 via receiver 24; for filtration of interference and noise and for checking that the information is correct. Indeterminable information received is filtered-out and never reaches the host unit 10. In this regard, tine two ~~{arrangements}~~ **[apparatuses]** 12 communicating with host units **[10]** have an internal data transmission protocol. The modus operandi of the arrangements 12 is therefore unique and does not incur additional load on the connected host units 10, wherein any additional work required for wireless data transmission is handled by the link 9 that includes the ~~{arrangements}~~ **[apparatuses]** 12.

When the ~~{arrangement}~~ **[apparatus]** 12 is constructed in accordance with the second alternative embodiment, the arrangement will preferably be portable and capable of being connected to a host unit 10 via the standard I/O ports of the host unit and the ~~{arrangement}~~ **[apparatus]** 12, without needing to supplement ~~{the}~~ host unit **[10]** with wireless communication software.

It will be understood that the aforedescribed embodiments are not intended to limit the scope of the present invention, but merely to illustrate exemplifying applications to one of

normal skill in this particular technical field. Accordingly, the number of embodiments conceivable to one. skilled in this art is only restricted by the scope of the following Claims.